

**SOME SIGNIFICANT NEW RECORDS OF ANTS
(HYMENOPTERA: FORMICIDAE) FROM THE SALISBURY AREA,
SOUTH WILTSHIRE, ENGLAND, WITH A KEY TO THE
BRITISH SPECIES OF *LASIUS***

N.C. BLACKER

c/o 1, Lowry Way, Lowestoft, Suffolk, NR32 4LW, U.K.

C.A. COLLINGWOOD

c/o City Museum, Leeds, Yorkshire, LS1 3AA, U.K.

Abstract. This paper discusses records of 26 ant species found in the Salisbury area between 1992 and 1999. Nine species are believed to represent additions to the Wiltshire county list. A further two species had only been recorded on one previous occasion. Records from adjacent areas of South Hampshire are included. Observations of the behaviour of some of the scarcer species are described. All 11 British species of *Lasius* were recorded and an identification key is provided for this genus.

INTRODUCTION

The published ant fauna of Wiltshire is relatively poor. Collingwood & Barrett (1964) listed 18 species as occurring in South Wiltshire and 13 in North Wiltshire, giving a combined total of 19. In comparison, the neighbouring Watsonian vice-counties of South Hampshire and Dorset have the richest faunas in mainland Britain, with 31 and 32 species, respectively, being listed in the same publication. This difference is in part due to the more restricted range of habitats in Wiltshire. In particular, Wiltshire has no coastline and lacks extensive areas of heathland, both of which make a major contribution to the diversity of aculeate faunas in Britain. However, the limited fauna probably also reflects the lack of attention from collectors, most being drawn to the richer localities to the south. This effect may be self-perpetuating.

This paper describes records obtained by the first author between 1992 and July 1999. Most come from within a 10 mile (16 km) radius of Salisbury. They include a number of scarce species, which shows that the ant fauna of Wiltshire is more interesting than previous work suggests. Records from adjacent areas of South Hampshire are also included.

A number of recent taxonomic revisions affect the British ant fauna, the most important being the major revision of *Lasius* by Seifert (1992). A key for the identification of *Lasius* of all three castes is therefore included, prepared by the second author.

METHODS AND DESCRIPTION OF MAIN SITES

All specimens were collected by hand. Trapping could yield additional results, particularly on open downland, which is difficult to search in the absence of features such as stones and pieces of fallen wood.

Six-figure grid references are provided for the main sites. Seven- or eight-figure references are used occasionally to clarify the exact location of a site. All records come from the 100 km grid square "SU" unless otherwise stated.

The month and year are given for the main records. The day is also given for the most important records and for many observations of sexuals, where the additional detail is informative.

The first sites visited were around Porton, about five miles north-east of Salisbury. Targett's Corner (185 370) was the most productive site in the village, but there were also significant records elsewhere, particularly northwards along the Tidworth Road.

The most important sites in this survey are on the Ministry of Defence (MoD) Ranges at Porton. These cover about 7000 acres (11 square miles) and are surrounded by farmland. They include the largest continuous tract of undisturbed chalk grassland in Britain (Anonymous, 1990). The records described here all come from two conservation areas, "Happy Valley" (around 235 385) in Wiltshire, and the Isle of Wight Woods (around 250 372) in Hampshire. Both include areas of open chalk grassland, scattered trees, and woodland, primarily of beech or conifers. The "antscape" on Roche Court Down (250 360) and a small ancient oak wood on Thorny Down (203 342) were only very briefly inspected. The Portway Roman road, which runs just outside the north-west boundary of the ranges, was also visited.

The Devenish Reserve (129 351), a small Wiltshire Wildlife Trust reserve in the Woodford Valley, north of Salisbury, also yielded significant records. It consists of small areas of beech woodland and chalk downland on the side of the valley. Between this site and Salisbury is Phillips' Lane (132 329) where high banks line the road up towards the hill-fort at Old Sarum.

The other main chalk site visited was Clarendon Palace, east of Salisbury (181 301). The banks beside the chalk track, approaching the palace from the direction of Salisbury, had an interesting fauna. The fauna of the woodland around the palace itself, which is partly on clay, was less diverse. Grovely Wood, north-west of Wilton, again mainly on recent clay which overlies the chalk, had a poorer fauna.

Sites on the older rock types west of Salisbury were hardly explored, but several sites on younger strata with acid soils, to the east and south of Salisbury, were visited. Hound Wood (226 301) and Bentley Wood (252 291) near Farley, and Common Plantation, Alderbury (199 279) contain mixed and conifer woodland. South of Redlynch, at the northern edge of the New Forest, are Langley Wood (224 205) an ancient oak wood, and mixed and conifer woodland at Tinney's Firs (203 198), Loosechanger Copse (210 187) and north-west of Nomansland (242 178). No significant areas of heathland were present at any of these sites, and this habitat may now be entirely restricted to Hampshire.

RESULTS

Subfamily Poncrinae

(1) *Hypoconera punctatissima* (Roger)

At about 19:30 hours on 7.vii.1995, an alate female was captured on a piece of clear plastic sheet lying on the ground in a garden in a modern housing estate at Fugglestone Rd, Salisbury (about 118 320). On further searching, a second was found dead in a spider's web on an adjacent fence, but none were found in the surrounding area and the species was not seen again. The weather was warm (about 20–25°C) and humid, with hazy sunshine.

This species is of uncertain status in Britain, and although often included in the list of native species, it is doubtful if it can survive in the absence of man, most records

coming from hothouses and organic waste heaps warmed by fermentation. The origin of these two specimens is uncertain, although alate females of this species are reported to be able to disperse over considerable distances (Donisthorpe, 1927; Collingwood, 1979).

Subfamily Dolichoderinae

(2) *Tapinoma melanocephalum* (Fab.)

This is a distinctive "tramp" species, spread throughout the tropics by man. In July 1998, at least 20 live workers and a number of dead adults were found inside the top of a mangosteen fruit from south-east Asia, purchased in a Salisbury supermarket. Brood (mainly larvae) were also present, but no queen. Two weeks later, some brood, without adults, presumed to be of this species, were found in similar circumstances.

Subfamily Myrmicinae

(3) *Myrmica lobicornis* Nylander

This species was found at several sites in Wiltshire and adjacent areas of South Hampshire. These are the first published records for Wiltshire. This species tends to be rather sparsely distributed. It is one of the more easily overlooked *Myrmica* species as typically only one or a few foraging workers are found. In this area survey, it was most often found at woodland edges.

It was first found in June 1993 on the MoD ranges at Porton. Workers were seen just inside woodland west of Tower Hill (238 382). It was subsequently found on a number of occasions at the same site and westwards along the edge of this wood, the most recent record being in July 1996. On 31.v.1994 a worker was found in a puddle on the track through Happy Valley, and on 5.vi.1994 a dealate female was found dead on the same track nearby (230 386). In July 1993 a worker was found across the Hampshire border in Isle of Wight Woods (252 372), foraging on top of a small *Lasius flavus* mound.

In August 1993, one or two workers were found along the Portway Roman road (229 393) and again a year later, including one worker climbing on a bramble leaf amongst the grass. In May 1997 a worker was found on the track to Clarendon Palace (179 300) fighting a headless worker of *M. sabuleti* or *M. scabrinodis*. In May 1998 two workers were seen (177 299).

Although there is a small area of suitable habitat at the Wiltshire Wildlife Trust's Devenish reserve near Little Durnford, it has not yet been found there.

(4) *M. rubra* (L.)

This species was much less common than the similar *M. ruginodis*, below, but was found at a few well-vegetated sites.

In August 1993 and May 1994 workers were found on a bridge in marshland near Gomeldon (182 359). A male and two workers were taken by the roadside at Newton Toney on 21.viii.1994 (215 402). Workers were found at Dinton in May 1995 (019 319) and at the Devenish Reserve, Little Durnford, in September 1995. In June 1996 and May 1998, workers were found near Clarendon Palace (174 299), feeding on the extra-floral nectaries of common vetch (*Vicia sativa*).

(5) *M. ruginodis* Nylander

This species is very widespread and was present at most of the sites visited, occurring in woodland, lush grassland and scrub. It is usually absent from open downland, where it is replaced by *M. sabuleti* or *M. scabrinodis*.

It was found on the Porton Ranges (both Happy Valley and Isle of Wight Woods), Porton village, Targett's Corner, along the Portway, at Phillips' Lane, Devenish Reserve, Clarendon Palace, Hound Wood, Bentley Wood, Common Plantation, Grovely Wood, and Langley Wood.

Females of the form *microgyna* were found at two sites. On 29.viii.1994 a dealate female and worker of this form were taken near South Tidworth in Hampshire (236 470). On 13.viii.1995 a dealate female *microgyna* was seen wandering on a tree stump at Common Plantation, and later a nest was found nearby containing alate females (199 279).

Specimens found in May and June 1993, feeding on the extra-floral nectaries of common vetch beside the Porton–Amesbury road (180 375), were initially thought to be *M. rubra*, but proved to be short-spined examples of *M. ruginodis*.

(6) *M. sabuleti* Meinert

This species is the dominant *Myrmica* species on most warm chalk downland sites and is usually abundant. It can also occur in gardens and other areas with short turf. Sites in the Salisbury area include the Porton Ranges, Porton village, Newton Toney, the Portway, Devenish Reserve, Phillips' Lane, the track to Clarendon Palace and Grovely Wood.

This species is known to tend aphids on the roots and herbage of the short turf it lives in, but on two occasions it was seen on the Porton Ranges with herds in unexpected situations. In June 1993 it was seen with aphids concealed on and under the bark of a juniper bush in Isle of Wight Woods. It may have also been tending a few on the foliage, but most of these were guarded by *Forunca fusca*. In June 1998, it was found with aphids on a small sprig two or three feet up a spruce trunk, on the edge of woodland west of Tower Hill.

This species is the main host of the large blue butterfly, *Maculinea arion*, throughout Europe (Thomas, 1992, p. 156; Thomas, 1994; Wardlaw *et al.*, 1998).

It is also the host for two workerless parasite ant species, *Myrmica hirsuta* and *M. (Sifolinia) karavajevi*, which were not found during this survey, but could be present. *M. hirsuta* males and females are very similar to *M. sabuleti* sexuals. *M. karavajevi*, which can also occur in *M. scabrinodis* colonies, is more distinctive, being rather smaller than its hosts.

(7) *M. scabrinodis* Nylander

This is another common species, but more localised than *M. sabuleti* on the MoD ranges at Porton and other chalk downland sites, where it was mainly restricted to the more exposed or sparsely vegetated areas, or in clearings in woodland. For example, on the Porton Ranges it occurs just outside woodland on Tower Hill (237 382), in a clearing in Happy Valley (236 386), and in the Isle of Wight Woods (252 372). It also occurs at Newton Toney (215 402), along the Portway (229 393), near the entrances to the Devenish Reserve and by the road outside, at Lake cum Wilsford (131 387), and Grovely Wood (055 344).

(8, 9) *Stenamuna debile* (Foerster) and *S. westwoodii* (Westwood)

These species have only recently been separated, but most British and European *Stenamuna* records are believed to refer to *debile*. The male caste is most easily distinguished, males of *debile* and *westwoodii* having three and five mandibular teeth respectively (Dubois, 1998). Examination of males taken in Porton village has shown that both species are present. The numerous worker records from that and other sites have not been separated.

The workers are small, slow-moving and inconspicuous, but may be found in leaf litter or on the soil surface, particularly in humid conditions. Thus they were more often found on the surface in early summer when the soil was still damp. It has been reported that they are most active in the early morning (Collingwood, 1979) which may be the case, but they can certainly be found at other times. They are most easily seen on bare soil around the base of banks, often beside roads, although traffic can hinder a search. Healthy, injured or dead workers are sometimes found on the edge of the tarmac. *Stenamamma* is quite often present at *Lasius fuliginosus* sites. *Stenamamma* will forage under black plastic sheeting placed in suitable areas, but we have never encountered it under fallen logs (in contrast to *Myrmecina graninicola*) so although it is difficult to find, observations suggest that it is not a truly cryptic genus and may somewhat resemble *M. ruginodis* in behaviour, as a general scavenger and predator on small insects. Prey items seen include flies, aphids, small mites and beetles and other unidentified insect fragments. They will take freshly killed springtails, when presented, but are more wary of ant brood. They will also accept biscuit particles and sweet materials. The female castes will sometimes curl into a ball on disturbance, like *M. graninicola*, below, which is much better known for this behaviour.

There is one very old Wiltshire record, from Dinton, west of Salisbury, in 1854 (Donisthorpe, 1927). This could belong to either species.

Stenamamma was first found by this author near Targett's Corner in Porton village (185 370) on 15.viii.1992, when a worker was seen right beside the road. It curled into a ball when captured. Next day, another was seen fighting a *Myrmica ruginodis* worker. It escaped unhurt on disturbance. Workers (some dead) were found on about ten occasions up to June 1994. On 18.ix.1993, two workers were seen fighting, but they separated when disturbed. The site was then visited less frequently and the genus was not seen there again until 1999, when it was found twice in May, with a final record in early July. A dealate female was found late in the evening on 16.ix.1992 and a male on 3.x.1993, at the edge of the road. Two more dealate females were found during very warm weather on 29.iv.1994. The first was captured in the late afternoon, again on the edge of the road, the second a little later in about the same place, curling up when handled.

Alates were more frequently found in a garden nearby (188 371), appearing between early September and early October. A dead male of *S. westwoodii* found indoors in mid-November may have been dead some time. One live male was also found indoors. Alates were regularly found trapped in spiders' webs and occasionally in water. A male taken on 4.ix.1994 is *S. westwoodii*, but another found on 28.ix is *debile*.

Stenamamma is present but elusive in woodland in Happy Valley on the Porton Ranges. Single workers were found on only four occasions. It was first found on 8.v.1994 on bare soil a few inches from a stump inhabited by *L. nylanderii* (c 239 387). It curled up when caught. Another worker was found on a track about 400 yards away (235 386) on the 31st of the same month. In May 1997 a number of small (about one foot square) pieces of black plastic sheet were laid in potentially suitable positions to attract this genus. On 19.x.1997, a worker was found curled up under one of the sheets laid within a few feet of the second record. Another was found under the same sheet on 28.vi.1998 (along with a 6-inch-long slow-worm!). None were ever seen under nearby sheets or others elsewhere, including several around the site of the first record.

The best site for observing these ants is on the track to Clarendon Palace (c 178 300). Workers were often relatively easily seen due to the very infrequent vehicle traffic. The first record was on 28.v.1995, when a number were found on bare soil by the track. One was carrying a small fly. Later, a loose trail typically consisting

of 8 or 9 workers was found, leading to a dead bee partially buried on the track. On 2.vi.1996, numerous foragers were visible—probably about 20 over about 100 yards. One tried to sting a small (1cm) green caterpillar, but it escaped. The author then killed it, and later at least six workers were present on it. Another worker was chased briefly by a rove beetle, *Pella lunularis*, the ant running and then rolling away, before uncurling and running off. The entrance to a nest was noticed in bare soil on a north-west facing bank, on the south side of the track. There was no pile of excavated soil outside the small hole. Up to a dozen foragers were visible by the track. These removed dead springtails and also fragments of biscuits that were placed nearby. On 16.vi.1996 there was plenty of activity. Twice, workers were seen apparently fighting. Again, what appeared to be a loose trail led to food hidden under debris at the edge of the track. The workers again carried off dead springtails, but were wary of *Lasius flavus* larvae, especially when undamaged. A 4 mm long, black weevil was attacked by one worker but escaped due to its hard armour. On visits in early August and early September, the species was not found, presumably due to dry weather, but one forager was seen near the nest on 13.x.1996. On 5.v.1997 a dealate female was found. The last visit to the site was on 25.v.1998, when at least 20 workers were seen, including one or two trails. The clearest involved a group of at least eight workers, and was still present approximately two hours later.

Stenamma was also found at Phillips' Lane (132 329) west of Old Sarum hill-fort on 30.v.1995. At least a dozen workers were seen along the roadside banks. Foragers were seen several times in May and June of 1996, including about 10 on 23.vi.1996. The most recent record was on 4.v.1997, when a dead worker was retrieved from a *M. ruginodis* forager. It looked to have been dead for some time, and was probably not killed by the *Myrmica*.

The Devenish Reserve (1285 350) is about 1¼ miles (2km) north of Phillips' Lane. On 23.vi.1996 several single workers were found in a very small area (not more than two square yards) of leaf litter near to the southern entrance to the reserve, near the path and about six feet from the first *L. nylauderi* colony (see later). A single forager was seen in exactly the same place in early May 1997 and two virtually together in mid-May 1998, but none were found on a final visit in June 1999. It was not seen elsewhere on the reserve.

On 5.v.1996, in the late afternoon, a single worker was found at Langley Wood (around 224 2045) slowly crossing an area where the leaf litter had been cleared about 15 minutes earlier. It disappeared into the fine vegetable debris on top of the soil, which had to be removed and checked very carefully before the ant could be captured. This site is a mature oak wood, and is the only *Stenamma* site in this study not on chalk, being underlain by London Clay.

(10) *Myrmecina graminicola* (Latreille)

The records described here are thought to be the first published for Wiltshire.

Myrmecina was found at a number of sites, in sheltered positions on grassland, in gardens, or open woodland, on chalk. This ant is slow-moving, inconspicuous and cryptic, and the workers are rarely seen in the open, normally being found under stones, moss, fallen wood or other debris. They are sometimes found in the nests of other ants. The female castes curl up when threatened, and climbing alates will often drop to the ground, which is an effective escape mechanism. The males are wasp-like, with dark wings. They are more robust and active than most male ants, but will sometimes "play dead" if disturbed, although they do not curl up like the more sluggish female castes. A captive male was seen to drink water and fruit juice unaided on 8.viii.1993.

The first record was from the MoD Ranges at Porton on 24.v.1992, when a single worker was taken on the Wiltshire–Hampshire border (241 388) under a log 1–2 ft from a *Lasius flavus* mound. On 16.viii.1992 another worker was found under a small stone on a rather barren slope in the Isle of Wight Woods (254 3725) in Hampshire. Subsequently, isolated foragers or small groups of workers were found on these ranges on numerous occasions. More rarely, colonies were also discovered.

This species was most easily found in open, scrubby woodland in Happy Valley (around 239 387). The ground in this area is very densely covered with flints of various sizes and both foragers and colonies were found under these. This species can tolerate some shade, but if this woodland is allowed to fully regenerate, the population in this area would be expected to decline considerably (although the shading could benefit *L. nylanderii*). Foragers were surprisingly rarely seen under the black plastic sheets laid in Happy Valley for *Stenamma* in May 1997. They were only seen under two sheets, both within yards of the location of the first *Stenamma* record, where single workers were found several times in 1999, between the end of March and late June. The final record on the Porton Ranges was also from this area, when about six workers were found under a stone on 2.vii.1999.

Elsewhere on the Porton Ranges, workers and nests of this species were more frequently found under pieces of fallen wood. In the Isle of Wight Woods (Hampshire) colonies were found at 248 369 and 255 3745. Workers were most frequently encountered around 256 370. It was not found on the open downland areas, such as in Happy Valley (233 386), Tower Hill (around 235 383 and eastwards) the Breck (around 250 380) or south of Isle of Wight Woods (around 250 367). Some of these areas are less sheltered or more sparsely vegetated than the known sites, but this lack of records may also reflect a lack of logs or stones to search under.

The colonies found were not excavated, but were estimated to contain very approximately 100 workers, and only single queens were seen. The brood cycle appears to be similar to other British Myrmecinae. A colony found under a log on 2.v.1993 had many well grown larvae and probably also some eggs. Of a total of seven nests found in the period 23.vii to 11.viii (between 1993–1995) all had worker pupae (except for one in a well shaded site which had mature larvae) with alate pupae in at least one. Some also had small to medium-sized larvae. On 15.viii.1993 about 20 adult males were present in a nest under a stone. On 23.vii.1995 a group of 6–10 workers, but no brood, were seen under a stone with a white woodlouse (*Platyarthrus hoffmannseggii*) although Donisthorpe (1927) reported that no myrmecophiles were known to occur with this ant. On 19.vii.1998 a dealate female was found in tunnels under a stone, but again no brood were seen.

From observations of captive colonies it appears that pale “callow” workers may not occur in this species, the pupae being fully pigmented before the adult emerges. This is unusual.

This species is known to enter the nests of other ants (Donisthorpe, 1927; Collingwood, 1979) and it has been suggested that they prey on the brood (Brian, 1977). Although this predation may occur, most of the numerous records of foragers from this site were not inside ant colonies, although (unsurprisingly) there were often foragers or tunnels of other species in the vicinity. Single workers were seen near nests of *Myrmica* species, *L. flavus* and *L. alienus*, but the only record in this survey from actually inside an alien colony was in a *M. sabuleti* nest, in September 1993. The *Myrmecina* worker was just inside or right beside the *Myrmica* colony, situated in a log, and entered a chamber in the log soon after the disturbance.

Alates were found outside a nest only twice at this site. A male on 14.viii.1993 in the Isle of Wight Woods (256 374) was seen climbing on grass on a bank and then flew off. An alate female was seen on the wall of a building (209 372) five days later.

Myrmecina also occurs in Porton village. In contrast to the records from the MoD Ranges, nearly all records were of sexuals. The only records of workers were of two specimens found dead in a garden near the Tidworth Road (188 371) on 9.v.1994 and 21.v.1994 and a live one seen on the tarmac of the drive on 3.vii.1999.

On 31.viii.1992 a dealate female was found in the same garden. Between 1992 and 1994 alates and dealate females were found at this site and nearby at Targett's Corner (185 370) and Southbourne Way and Malvern Way (187 369) many times from the end of July (30.vii.1994) until the middle of October (11.x.1994) but most frequently from approximately mid-August to mid-September. Dealate females were also seen in the spring and early summer (for example 27.iv.1994, 29.iv.1994, 7.v.1994, 10.vi.1994 and 13.vi.1994) presumably searching for food or a new nest site, like queens of other myrmicine species.

Single alates were seen on walls and concrete surfaces, including both horizontal and vertical faces. Small groups of alates were seen on several occasions. Late in the afternoon of 6.viii.1993, a group of five alate females, each 1–2 inches apart, were on top of a low wall in Southbourne Way. All were crouching still and difficult to spot, and the dark wings of both sexes may act as camouflage. About 20 yards away, in Malvern Way, there was a similar-sized group, which included a mating pair. Several isolated alate females were also seen. The mating pair was captured and later mated again in a container for 15–30 minutes. About half an hour later, the female started to shed her wings, although she did not complete this until about an hour later. Next day, at about 18:00, an alate female was seen in the same place in Southbourne Way, and three more half an hour later. On 8.viii.1993 one alate female was present there, and a male in Malvern Way. On 13.viii.1993, two single alate females were on a different area of wall in Southbourne Way, where they were catching the evening sunshine. Early in the afternoon on 19.ix.1993, despite breezy weather, becoming dull, a larger group was found in a garden on the Tidworth Road. About six males and a similar number of alate females were congregated on the edges of some steps, most on the top surface, some on the vertical faces. They were in loose groups, the females virtually immobile most of the time, the males slightly more active and more dispersed. One mating pair was seen. By mid-afternoon, fewer were present, especially the males, and by early evening the weather had deteriorated and none were seen again.

These alates had presumably just been released from the nest for the nuptial flight, but were never seen guarded by workers. This contrasts with most British species, but is consistent with the observations of Crawley, noted in Donisthorpe (1927). As they were slow-moving and rarely observed to fly off, and were sometimes seen in the same place over a period of several days, the females probably wait for males to fly to them, perhaps attracted by a pheromone, with mating occurring on the ground. They must either hide nearby or be accepted back into the nest overnight or in poor weather. However, alates were sometimes found trapped in spiders' webs or water, which shows that many, if not all, fly at some stage, and an alate female was seen at least 10ft in the air on 26.viii.1994. Either the alates may fly away from the nest and congregate at mating sites, or disperse by flight after mating.

Myrmecina was also found on one or more occasions at four other sites.

On 21.viii.1994, two males and a dealate female were found on a wall in Newton Toney (c215 402). Later on the same day an injured worker was taken, found stuck in soil at the edge of the track along the Portway (c229 392).

It was also recorded from the Devenish Reserve (c1285 350). On 30.v.1995, up to 15 workers and a probable dealate female were seen on open soil on the path immediately outside the northern entrance to the reserve (129 352). Several went into a small hole, presumably the nest entrance. On 25.vi.1995, one worker was seen in the same place. As noted earlier, it is unusual to see workers of this species in the open on the soil surface. On 17.ix.1995, an alate female was glimpsed immediately outside a *Myrmica scabrinodis* nest on the bank beside the road, when NCB disturbed the nest. On 30.vi.1996, a worker was found under a large log amongst lush grass on the slope of the valley side, with or near some *L. flavus*.

This species was also found a few times along the track towards Clarendon Palace, most from a short distance nearer to the Palace than most of the *Stenamma* records (about 178 300). On 2.vi.1996 two dealate females were found a few yards apart in the open on an exposed chalk face at the base of a steep bank by the track. In mid-afternoon on 8.ix.1996, two males were seen, one resting on the track, the other, flying, landed on the author's arm. On 13.x.1996, alates of both sexes were present. One dead dealate female, one dead and one injured male were taken. About 10 males were seen along the track, on the chalk. Most were in semi-shade or on the sunny side of the track. Several flew, especially when handled. One alate female flew in and landed, and the alates may be attracted to congregate on pale surfaces like *Myrmica ruginodis*. Males of one or two *Myrmica* species were also flying. Two dealate females were found separately by the track on 5.v.1997. On 25.v.1998, two dealate females were within a foot of each other, where alates were seen in October 1996, and a worker was seen near where the species was first recorded, with another worker, dead, a few feet away.

(11) *Leptothorax acervorum* (Fab.)

This species is present at many open woodland sites. It is widespread on the MoD Ranges near Porton, including Tower Hill, Happy Valley, and the Isle of Wight Woods, and is present nearby, along the Portway. It also occurs near Gomeldon village (184 360), on Devenish Reserve (on the roadside bank), at Lake cum Wilsford (131 387), Clarendon Palace, Common Plantation, Bentley Wood, and near Fovant (002 297).

Observations of this species attacking *Formicoxenus nitidulus* males and a *L. nylanderii* worker are noted under those species.

(12) *L. nylanderii* (Foerster)

This scarce species was found at two sites. The only previous record for Wiltshire comes from Whiteparish in 1960 (Collingwood, 1961). Surprisingly, there are very few reliable records of this species from the New Forest, the only recent one being from just north of Brockenhurst in July 1999 (Simon Hoy, personal communication).

On 29.viii.1993 a worker was noticed on or just under the remains of a birch log on the ground in a clearing in scrubby woodland in Happy Valley on the MoD Ranges at Porton (c 239 388). A colony was then found in an old but hard tree stump a foot or so away. One or two dealate females, alate females and at least two males were seen. A subsequent search of other tree stumps in similar, fairly sunny, situations in nearby clearings was unsuccessful.

On 30.iv.1994, several workers and a dealate female were found foraging on an old stump in a more shaded position in open beech woodland some distance away (c 240 386). During the remainder of 1994 a careful search was conducted and it soon became clear that this species usually favours shaded positions. The workers tend to avoid prolonged exposure to intense sunlight and high temperatures, which is

atypical of British ants, and in contrast to the other British *Leptothorax* species. Over 100 colonies were eventually located in the scrubby woodland where the first nest was found, several within ten yards of it. Most were in old but hard tree stumps, the others in smaller fragments of wood. On stumps in sunnier positions, *L. nylanderi* was invariably on the shaded side or, in the case of hollow stumps, on the inside surfaces, often shaded by low herbage. In some cases, *L. acervorum* was nesting on the same stump, usually occupying the sunny side. The only interaction seen was an *acervorum* worker attacking a *nylanderi*, even though *nylanderi* is said to be the more aggressive species, despite its smaller size (Collingwood, 1979).

From mid-June onwards, numerous colonies were found in a mature beech wood immediately to the west (around 238 388). Most nests were in cracks and beetle holes in fallen branches lying amongst dense leaf litter. Small branches, only an inch or so in diameter and often lacking bark, seemed to be preferred over larger logs or smaller twigs. Some also occurred in stumps or in dead wood at the base of beech trunks. There was little or no living vegetation near these nests. This is of particular interest because the deep shade of beech woodland is a poor habitat for ants in Britain, and the only other species present in the shadier areas were small numbers of *M. ruginodis* and occasional *F. fusca* foragers.

The approximate range of this species is defined by the four grid references 235 385, 237 389, 242 391 and 240 385. It is clear that these two habitats and peripheral areas support several hundred colonies, or more—a substantial population for this scarce species. Interestingly, it appears to be extremely rare in an area of very similar beech woodland in the Isle of Wight Woods (Hampshire) with only one record—on 6.v.1996 a single worker was seen amongst leaf litter near two large beech trees (c 256 370). A possible reason for its rarity is that the Hampshire site is not sheltered from the prevailing south-westerly breeze. It is tempting to speculate that a slight increase in average temperatures (“global warming”) could allow the species to increase at this site.

As disturbance of the nests was avoided, alates have only been observed twice, at the end of August. The first occasion was when the species was originally found, the second on 28.viii.1994, when a male was seen being carried to a new nest site. It was carried in the manner typical of *Leptothorax*. Dealate females were observed more frequently, mainly in spring and early summer (late April to July). These are presumably nest-founding females, foraging for food. However, as most were seen in the vicinity of workers, and on 12.vi.1994, one was seen apparently carrying food into an established colony, it is possible that some may be acting temporarily as “workers” associated with a mature colony. On another occasion, two females were seen fighting on a tree-root.

Two colonies have also been found at the Devenish Reserve (1285 350), just over 7 miles (11.5 km) to the west-south-west of the main Porton site at Happy Valley. Both were in sheltered beech woodland at the edge of the valley floor. On 30.iv.1995, the first colony was found near the southern entrance, in an abandoned pole, in the hedge at the reserve boundary by the road. On 25.vi.1995, a second was found in a very old tree stump 100 yards or so to the north-east. Both colonies were still present on 1.vi.1999.

(13) *Formicoxenus vitidulus* (Nylander)

This species was also recorded from just two sites, the first records from Wiltshire. It was not found at the other *Formica rufa* sites noted, but may well be present.

It was first found at Hound Wood, near Farley (c226 301) on 2.vii.1993. A single male was found at the edge of a large *F. rufa* heap. On 30.vii.1993 at least four were

seen on the same or a nearby heap, mostly on top of a stump in the nest. They were very active, and two were seen to “greet” each other.

On 21.ix.1995 it was found at Common Plantation, near Alderbury (c 199 279). About a dozen males and a worker were found on a large *F. rufa* nest, often climbing or resting on the tips of pine needles. At least 20 males were present on a different heap a hundred yards or so away, and once or twice these were seen chasing and grasping each other. The species was subsequently found at that site on a number of occasions up to July 1999. Most records were from May, September and October, but they were recorded in every month between late April and early December with the exception of June.

Workers were seen in late April, May, July, August, September, October and, in 1995, in early December. Usually only one or a few were visible. On one occasion, two workers were seen “tandem running”. A worker was once seen to carry another across a *Formica* heap in the same manner as *Leptothorax* species. The workers from a colony fragment captured from an abandoned mound (see below) behaved similarly. A worker was once seen to be picked up two or three times by a *Formica rufa* worker, but it was released unhurt—usually they are overlooked or ignored, or occasionally threatened.

Males were found in May (once only, in 1997), August, September, October and, in 1995, early November. The males, once present, are usually more numerous and conspicuous on the mound surface than are the female castes. On 15.x.1995, dozens of males were present on one heap, with several females (alate and dealate) under clusters of males. On 15.ix.1996, literally hundreds of males were visible on the surface of the same well-populated mound, along with two alate females. The females were just beyond the edge of the mound, one on a bramble leaf, and some males were seen six inches from the heap. Males were also active on other heaps, but in far smaller numbers. 18.v.1997 was the only occasion when males were seen in the spring (albeit on a different heap) with 20+ active. These had presumably overwintered. On 7.ix.1997 they were again quite abundant on many different heaps, and two males were attacked by *L. acervorum* workers, which in one case even attempted to sting, but both *Formicoxenus* seemed to escape unhurt when disturbed. The males actively patrol the mound surface, sometimes apparently favouring certain areas, such as the top or pieces of wood in the nest. They have been seen to pursue and attempt to mate with not only alate females, but dealate females, workers and sometimes even each other, at least briefly! Sometimes two or three, perhaps more, will climb on to a single “victim” which is probably grasped by the neck or thorax. The males will also “greet” each other with their antennae, like workers.

Alate females were seen in August, September and October. They were sometimes found near the edge of the heaps or on the ground or low vegetation nearby, but were never seen to fly. They are reported to adopt a “calling posture” and attract the more numerous males with pheromones (Buschinger, 1976) but such behaviour was not seen by NCB. The dealate females were seen in late April, May, August, September and October, wandering on the heaps, sometimes near the edge, but not on nearby vegetation. They were presumably searching for nest sites or food. Most British myrmecine species, including the closely related *Leptothorax*, behave similarly.

It has been reported that *F. nitidulus* is able to emigrate in the columns of host workers when the latter change nest sites (André, 1881) and more recently it has been confirmed that they can follow odour trails laid by the *Formica* (Elgert & Rosengren, 1977). Observations at this site suggest, however, that their ability to do this may be, at best, rather limited, and it may only be possible over short distances. On 16.viii.1998, at least 20 workers and about a dozen females (about half of them alate)

were seen on a recently abandoned *Formica* nest, especially on the top. There were also two workers about three feet along a fallen tree trunk which lay beside the nest. None were visible a week later, but the following week several workers and at least one dealate female were seen. On 13.ix.1998, again none were visible on the surface of the heap, but the nest material was deposited beside what was thought to be the new nest of the *F. rufa* colony, about 100 yards away. About 20 *Formicoxenus* workers and a similar number of females were seen on the material afterwards. In addition, two small groups of workers with brood were found under the bark of a stump deeper inside the abandoned heap, and these were captured, along with two single dealate females and several single workers, from the remaining nest material, to give a group of two dealate females, 21 workers and a few eggs and small larvae. These were released a week later, along with another three workers and a dealate female found at the old nest site. Early the following May, two workers were seen at the new site, but the *Formica* were again moving, this time to a site 10–15 yards away. At the end of the month, none were seen at either this latest or the newly abandoned heaps, and none were found in the process of again moving the nest material to the latest site, but in early July a worker was seen at the remains of the recently abandoned nest. None were found at the original site in 1999 and it would be interesting to know if the *Formicoxenus* would have survived the winter at the abandoned site.

These observations do not provide any evidence for the other mystery of *Formicoxenus* biology—their food source. They have been reported to receive regurgitated food from the *Formica* workers (Stäger, 1925, confirmed by Buschinger, A., personal communication, in Holldobler & Wilson, 1990, p. 465) but Stumper (1950) concluded that this must be uncommon, as most *Formicoxenus* workers keep strictly to themselves. Certainly, this behaviour has not been observed by the current authors, so presumably occurs only within the *Formica* mound. The small colony kept by the first author for one week, without *F. rufa*, ignored some freshly killed springtails offered, and probably also some small *Myrmica ruginodis* larvae, but took some milk chocolate.

Subfamily Formicinae

(14) *Lasius flavus* (Fab.)

This species is essentially universal on chalk downland and other areas of well drained, close-cropped grassland, including gardens. It is present on the MoD Ranges at Porton, the Devenish Reserve and most of the sites discussed in this paper, although it is much less abundant in woodland, especially on some acidic or clay soils, such as those underlying the *Formica rufa* sites in this area.

The population on the MoD Ranges at Porton has been estimated at 35 billion ants, nesting in three million soil mounds, and the “antscape” on Roche Court Down is regarded as a habitat of national importance (Anonymous, 1990). However, the statement that many of the individual mounds are 80–100 years old is unlikely to be correct, although the soil mounds of extinct colonies will be continually recycled.

On 5.vii.1998 on the Porton Ranges, a queen with distended gaster and clusters of eggs nearby, was seen near the surface when a mound was opened. This is noteworthy because the nest queens are rarely seen, normally remaining hidden deep within the nest. On 4.x.1998, worker pupae were still present in some nests, and, more notably, eggs were seen in at least one. On 28.iii.1999, clusters of small black aphid eggs were seen in a nest, also at Porton. Following the disturbance, they were carried into the nest by the workers. Medium-sized queen larvae were already present. These observations suggest that larvae are overwintered, which is probably

atypical of British formicines. Finally, on 9.v.1999 the myrmecophilous beetle *Claviger testaceus* was found in another colony, also at Porton.

(15) *L. alienus* (Foerster)

Literature records could refer to this species or to *L. psammophilus*, below.

This species occurs in several areas of the MoD Ranges at Porton, often on or close to vehicle tracks, and in other areas where the vegetation is too sparse to support competitors such as *L. flavus* or *Myrmica* species. It is present along the ridge west of Tower Hill, along the track through Happy Valley, and in the Isle of Wight Woods. It should be present on other, similar, sites. On 4.vii.1993, workers were found climbing a pine tree (around 232 384). Such behaviour is unusual for this species in Britain.

It was also found along the Clarendon Way in May 1995. It is probably present at the Devenish Reserve—in June 1996 a worker, believed to be of this species, was seen on a log on the valley side, but it was not captured, so the record could not be confirmed.

(16) *L. psammophilus* Seifert

This species has recently been split off from *L. alienus* (Seifert, 1992). It is believed to favour acid heathland, so the single record, from the Porton Ranges, was unexpected. Any literature records of *L. alienus* from heathland in South Wiltshire would presumably refer to this species.

On 14.viii.1993 workers and flying alates were taken from dry, sparse chalk grassland in the Isle of Wight Woods, Hampshire (c255 374). The site was an area of grassland warm enough to support a population of the silver-spotted skipper butterfly (*Hesperia comma*) which requires high temperatures (Thomas, 1992).

(17) *L. brunneus* (Latreille)

This was the most important record from this study and the first from Wiltshire. This is a “Notable A” species (Falk, 1991). Most British records of this scarce and unobtrusive species are from the Greater London area and the upper Severn Valley. The nearest established localities are in the north-east corner of Hampshire. It has not been recorded from the New Forest, even though habitat that would appear to be suitable is present there.

This species is arboreal, usually living in dead wood and obtaining food from aphid herds, including species which live on or under bark. It has been found on a wide range of trees, but ancient oaks are favoured (Donisthorpe, 1927). The classic British locality is Windsor Great Park in Berkshire. It is much less aggressive than potential competitors such as *L. niger* and *L. platythorax*.

It was found only in Happy Valley on the MoD Ranges at Porton. On 2.vii.1994, some very small *Lasius* workers were noticed amongst *Leptothorax uylauderi* workers at the base of an old, double-trunked, beech tree (c236 386). It was still present at the beginning of July 1999, although the workers were still mostly rather small, suggesting that the colony is still not a strong one. No other colonies have been found, even on the oak trees that are present near the railway line and along the Portway beyond. It is even just conceivable that the colony was founded by a female brought by train from nearer London!

The nest is not discernible from the ground, but is at least 20 ft up, as workers have been seen (with difficulty!) climbing one trunk up to about that height. Workers are mostly seen when descending to the base of the tree and ascending carrying food in their crops. The source of this food is unknown. On 27.v.1996, several were seen

carrying medium-sized worker larvae up the trunk. In 1999, at least two foragers were seen about three feet away from the base of the tree, on a fallen branch. Another was seen foraging in the leaf litter about eight feet from the tree. They will take sweet liquids put down as bait. Freshly killed larvae and pupae of other ants are also taken, but less readily, unless mixed with sweet foods. When baited, up to about 90 workers have been visible at once, on the food and climbing the trunk. The workers are active and "nervous" in behaviour, reminiscent of *Tapinoma erraticum*. They will harass and drive off, with a reasonable degree of success, other insects and foragers of ant species such as *L. nylanderi*, *M. ruginodis*, *L. niger/platythorax* and *F. fusca*, which attempt to take this food. The workers have been seen in spring and early summer, from early May to the first half of August. In 1998, the only record was of a few workers, believed to be *L. brunneus*, glimpsed at least seven feet up the trunk, presumably deterred from coming lower by the presence of *L. niger/platythorax* at the base of the tree. The author killed these on several occasions, which successfully deterred them from visiting the tree. *L. brunneus* has not been visible later than August, even in the absence of such competition, so by then they are presumably relying on food sources in the crown of the tree.

In total, seven species of ants have been recorded from this beech tree. Although rather fewer than the 40+ which have been found on large canopy trees in tropical rain-forest, this is a very respectable total in a temperate region!

(18) *L. niger* (L.)

The "common black ant" is widespread and often abundant in most urban and suburban areas in southern England, including this area of Wiltshire. Records from rural or semi-natural habitats included the MoD Ranges at Porton, Newton Toney, the Portway, Devenish Reserve, Phillips' Lane, Grovely Wood (055 344), the Clarendon Way, Common Plantation and Bentley Wood.

On 2.viii.1992, a nest queen with distended gaster was found in a colony under a flint at a site north-west of Porton village. This is unusual, as noted already for *L. flavus*.

In the late afternoon on 5.viii.1994, some small Phorid flies were seen harassing *L. niger* workers (that were themselves attacking *L. flavus*) in a garden in Porton. One fly was captured.

(19) *L. platythorax* Seifert

This species has only recently been separated from *L. niger* (Seifert, 1992) so there are no previously published records from Wiltshire. It closely resembles *L. niger*, but the workers are usually larger and nests occur in wood or damp areas. It was found on several occasions on the MoD Ranges at Porton. Workers probably of this species have been seen around the base of the tree inhabited by *L. brunneus* and it definitely occurs on another large beech approximately 50 yards away. Other proven colonies occur in tree stumps in other areas of Happy Valley (230 3855 and 2385 388).

(20) *L. fuliginosus* (Latreille)

Colonies of this species tend to be widely scattered but long-lived. The carton nests are deeply buried and, unusually for a British ant, are often shaded by thick vegetation, so the exact nest site can be difficult to locate, even though columns of the large, shining black workers can be very conspicuous. The species is also unusual for the long season over which alates have been found, from May to October (Collingwood, 1979).

It occurred at several sites near Porton. The first record was in July 1992, from Targett's Corner in Porton village (185 370) where it was still present in July 1999. On 13.vi.1993, an injured dealate female was seen there, being dragged by workers. On 30.vii.1994, a male was found dead nearby in Porton village. *L. fuliginosus* was found along the Portway on 7.viii.1993, when a partially dealate female was seen with workers (probably at 2295 393). These were seen again, probably nesting at the base of a pine, on 21.viii.1994. An alate female was also seen. On that date, another colony was found amongst beech trees at 2315 395. A dealate female was found injured on the track through woodland in Happy Valley on the Porton Ranges on 3.vii.1994 (238 386). No colony was found on the MoD Ranges, but it could well be present somewhere on site, perhaps in the cultivated areas around the perimeter.

It also occurs near Clarendon Palace. On 28.v.1995 trails were present on the track at 178 300 and a nest was found at the base of a large, old oak around 189 3035. Males were seen outside the latter colony. A male was seen by the track at the first site on 16.vi.1996. On 5.v.1997 an alate female and at least four males were seen on the oak, and on 25.v.1998 at least two alate females and many males were going up and down the tree.

(21) *L. umbratus* (Nylander)

L. umbratus and the following three related species are more strictly subterranean than *L. flavus*, which they superficially resemble. Although they sometimes construct soil mounds over their nests, the brood are rarely, if ever, found in the upper levels of the nest. It is also uncommon to find all three castes together, which is unfortunate, as such complete series greatly assist identification in this taxonomically difficult group. The four British species can be divided into two pairs. *L. umbratus* and *L. meridionalis* both have erect hairs on the scapes and tibiae. *L. mixtus* and *L. sabularum* do not. Significant variation can occur, so some identifications between species within each pair are tentative.

The records for *L. umbratus* listed below are believed to be the first for Wiltshire. Although recorded from several sites (mostly in gardens or by roads) all are based on sexuals, particularly females.

Dealate females and alates of both sexes were taken in Porton village on 14, 21, 22.viii.1993 and 24.ix.1993, including a dealate female killed by *L. niger*. A dealate female was found dead near buildings on the MoD site at Porton on 19.ix.1997.

Two alate females were captured, and others seen, in the nearby village of Allington (c 205 3915) on 21.viii.1994. On the same day, another was found along the Portway (c 228 392) and males were retrieved from spiders' webs.

Dealate females were twice found dead on pavements in Salisbury (around 151 295 on 20.ix.1997 and at 140 316 on 30.viii.1998).

(22) *L. meridionalis* (Bondroit)

Another new record for Wiltshire, this species was unexpected, being mainly known from East Anglia, Surrey and South Wales where it has usually been found on acidic or sandy soils, including dunes and heathland (Collingwood, 1979).

Most of the records reported here are again based on females.

In Porton village, a dealate female was taken, and others seen, on 14.viii.1993. An alate was found on 10.x.1993. On 14.ix.1995, three dealate females were being killed by *L. niger* workers near MoD buildings. Others were seen alive in the vicinity. A specimen of a dealate female (1993) and a worker (1995) also from this site, unfortunately lack clear collection details.

On 2.ix.1996 an alate female was found on the pavement along the Wilton Road, Salisbury (137 304). A dealate female was seen nearby.

(23) *L. mixtus* (Nylander)

Most of the records are from the MoD Ranges at Porton, usually workers taken under logs on grassland and in open woodland.

Workers were taken twice in the Isle of Wight Woods in Hampshire (approximately 256 370) on 23.v.1993, with further records on 17.vii.1993 and 14.viii.1993.

It was also recorded from areas of the site in Wiltshire. On 4.vii.1993 two workers were found on Tower Hill at about 238 382. There were several records from Happy Valley. On 31.v.1994, workers from two colonies were found. On 24.vii.1994, three workers were captured from under a very old birch log in leaf litter at the edge of a clearing in the beech wood (c238 387) where there was very little vegetation present to support root aphids. On 1.x.1995, all three castes were taken from an irregular soil mound, about six inches high, in a clearing beside the main track through Happy Valley (c237 3855). Some workers were visible outside and alates of both sexes were visible at the entrances. This was a rare opportunity to capture all castes of a *L. unbratus* group species together.

On several occasions, dealate females were found alone under objects in circumstances which suggest that they can overwinter alone before trying to gain entry to the nest of a host species of *Lasius* to initiate a new colony. On 3.v.1993 one was found under a large log in partial shade, in Happy Valley. Only *L. flavus* occurred nearby. On 4.ix.1993 another was found in the same area in similar circumstances. The next day, one was taken from a chamber under a flint in quite deep shade, beside a large pine by a track in Isle of Wight Woods (c 249 373). Another had been seen earlier in the day beneath a log, with a few *L. flavus* workers quite nearby. Yet another, seen on 4.x.1998 near Tower Hill, alone in a cell under a piece of wood, was also most likely to be of this species, or *L. sabularum*.

This species was also found at the Devenish Reserve, on 6.x.1996, when two workers were taken amid some excavations under a new fence post laid down on slightly shaded grassland.

An alate female was taken on a path in Salisbury (139 312) on 19.ix.1998.

(24) *L. sabularum* (Bondroit)

This is a recently re-described species, very similar to *L. mixtus* (Seifert, 1992) and thus the first records published for Wiltshire.

The first record was on 3.v.1993, when two workers were found under a log in Happy Valley. Other records from that area were 29.v.1994 (four workers under a stone) and 4.x.1998, when several workers were seen with root aphids, again beneath a stone (c 240 388). On 20.vi.1999, two large workers were found under a section of tree trunk on grassland (235 385).

On 5.viii.1994, a dealate female was found dead near buildings (209 372).

On 6.vi.1993, about ten workers were found under a log in the Isle of Wight Woods (c247 373, Hampshire). *L. flavus* occurred under logs to either side. In April 1997, four workers were collected by Porton Conservation Group members from under an object, during archaeological excavations at New Lodge, again in the Isle of Wight Woods (around 243 372).

There were two records from Porton village. On 4.ix.1994, an injured male and a dealate female were found separately beside roads. On 1.x.1994 an alate female was found in a garden, in a spider's web.

It also occurred at the Devenish Reserve, when three workers were found under a log on 10.v.1998.

There was one record from Salisbury. On 26, 27.vii.1998, all three castes were present inside a porch (140 316). On the second evening, many workers, hundreds of males and about twenty alate females were seen.

(25) *Formica fusca* L.

This species is widespread but local, occurring in heathland areas and open woodland on acid soils, and in open woodland or along woodland edges on chalk. It does not normally nest on open chalk downland.

It is widespread on the Porton Ranges, including Happy Valley (Wiltshire) and Isle of Wight Woods (Hampshire). At least two males and some pupae were seen in a nest on the Porton Ranges at the late date of 4.x.1998. Other records from chalk sites include the Portway (228 392), Newton Toney (215 402), and near Shipton Bellinger (240 458, in Hampshire), all in August 1994. It is present on the bank beside the road at the Devenish Reserve. A colony was found between Bemerton and the Wilton Road, Salisbury (115 315) in June 1996.

It should occur at all of the sites listed for *Formica rufa*, below, and has been definitely recorded at Hound Wood (July 1993), Common Plantation (May 1995, still present in 1998), Loosehanger Copse and Tinney's Firs (July 1996). Other sites on (presumably) acid soils are Bentley Wood (May 1992, 252 291), Grovely Wood (055 344 and 070 335, July 1995) and between Dinton and Teffont Magna (ST 996 3145, May 1995).

(-) *Formica cunicularia* Latreille

This species was not found in Wiltshire during this study, but may still occur, as it was found twice on heathland in neighbouring areas of Hampshire. A worker was seen at Hale in August 1995, on the heath beyond the *Formica rufa* colonies (see below). In July 1996 one worker was found at the edge of the road near Hope Cottage (225 1685) immediately adjacent to the county boundary.

The previous Wiltshire records are from Redlynch and Hamptworth in the south of the county, and West Kingston in the west, in 1960 (Collingwood, 1961).

(26) *F. rufa* L.

This species is present at a few woodland sites on acid soils to the east and south-east of Salisbury. It was first found at Hound Wood, near Farley (226 301) in June 1992, but was not seen on a visit to Bentley Wood, further to the east. The ants at Hound Wood are reputedly introduced. In May 1995 it was found at Common Plantation (196 280 to 2005 279) nearer to Alderbury. It was also found at three sites further to the south in Wiltshire, at the northern edge of the New Forest—near Nomansland (242 178) in May 1996, Tinney's Firs (203 198) and Loosehanger Copse (210 187 and 2125 188) in July 1996. In August 1995 it was found at Hale in Hampshire (around 190 180). Although there is concern at the decline of "wood ants" in many areas of Britain, they were still present when these sites were last visited—Hound Wood in October 1998, Loosehanger Copse and Hale in May 1999 and Common Plantation in July 1999.

At Common Plantation, sexuals were seen during May in 1995, 1997, 1998 (inside one nest) and 1999. Two worker pupae were still present at Hound Wood at the late date of 18.x.1998.

There is an old record from Franchise Wood in 1965 (Collingwood, 1966).

SUMMARY

Records of 26 species are reported. Of these, *T. melanocephalum* is certainly introduced and *Hypoponera punctatissima* has uncertain status. Of the 24 definitely native species, 9 are believed to be the first published records from Wiltshire. Three of the *Lasius* species (*L. platythorax*, *L. psammophilus* and *L. sabularum*) have only recently been separated as species (Seifert, 1992).

Myrmica lobicornis, *Stenamma debile* (or *S. westwoodii*, as the species have only recently been distinguished), *Myrmecina graninicola*, *Formicoxenus nitidulus*, *Lasius brunneus* and *L. meridionalis* are also noted for the first time.

This increases the total list of ant species recorded from Wiltshire from 19 to 28.

In addition, both *Stenamma westwoodii* and *Leptothorax nylanderi* have only been recorded on one previous occasion.

Five predominantly heathland species, *Tapinoma erraticum/ambiguum*, *Myrmica sulcinodis*, *Tetramorium caespitum*, *Formica cunicularia* and *F. sanguinea*, formerly recorded from South Wiltshire (Collingwood, 1961, Collingwood & Barrett, 1964) were not found. The heathland areas in the extreme south of the county were not well searched, but the decline in this habitat may have led to them becoming extinct. The "wood ant" *Formica rufa*, was found on acid soils, with the inquiline *Formicoxenus nitidulus* also recorded from two sites.

The MoD Ranges at Porton proved to have a rich fauna, with 20 species present. This list includes *L. brunneus*, a Notable A species, and several other scarce species. Only *Myrmica rubra*, *Formicoxenus nitidulus* and *Formica rufa* were not found there. It is particularly noteworthy that all 11 of the currently recognised *Lasius* species found in mainland Britain have been found at that one site.

The Devenish Reserve, a small Wiltshire Wildlife Trust Reserve north of Little Durnford, also yielded some significant records. 12 species were recorded, including *Stenamma debile/westwoodii*, *Myrmecina graninicola* and *Leptothorax nylanderi*.

DISCUSSION

The results clearly show that the ant fauna of Wiltshire is under-recorded and deserves more attention than it has received in the past.

Most of the area covered by this survey can be divided into two general areas, one underlain by Cretaceous chalk, the other by Tertiary sands and clays. There is also a small area with earlier Cretaceous strata (Geological Survey, Sheets 298, 314 and 315).

The bedrock over most of the Salisbury area is Upper Chalk, which is soft and contains flints. The soil cover varies in depth but the pH is usually alkaline, except in small areas that are particularly well drained or overlain by acidic deposits. Typical chalk downland is well drained and nutrient poor, and is well known for its rich flora, most notably a range of orchid species (Anonymous, 1990). The habitat is also notable for supporting a diverse butterfly fauna (Thomas, 1992). Where the turf is adequately grazed, high population densities of ants are present, particularly *Myrmica sabuleti* and *Lasius flavus*. Open, mixed woodland on warm chalk sites can have a rich ant fauna, including scarce species such as *Myrmecina graninicola* and *Stenamma* and also *Lasius unibratus* group species. Climax beech woodland casts a deep shade and is usually poor for ants in the British Isles, but *Leptothorax nylanderi* is present in this habitat at Porton, and the only *Lasius brunneus* colony found was also nesting in a beech tree, albeit in a warm position.

It is noteworthy that the best chalk woodland surveyed has a more interesting fauna than the woodland areas of the New Forest, where there are few or no recent reports of *Stenamma*, *Leptothorax nylanderi* and *Lasius fuliginosus*, and no records at

all for *Myrmecina* and *Lasius brunneus*, despite the attention of numerous collectors over at least a century.

Although *Leptothorax nylanderi* is numerous in one area of the Porton Ranges, only a single worker was found in another area of potentially suitable habitat nearby, and just two colonies were located at the Devenish Reserve. If careful monitoring showed a clear increase in these populations or an expansion of its range, this could be an indication of climatic change. An increase in temperatures might also benefit *Lasius brunneus*.

Acidic soils mainly occur where Tertiary strata outcrop to the south-east of Salisbury (Alderbury eastwards) and again in the north of the New Forest, south and east of Whiteparish. These consist of sands and clays. In the Dinton area, west of Salisbury, earlier strata, including the Middle and Lower Chalk, Upper Greensand and Gault Clay, are exposed. Acid soils can give rise to heathland, but no extensive tracts are present in the study area. The main areas in the north of the New Forest are in Hampshire, and even these have a poorer fauna than around Beaulieu and Brockenhurst, further to the south. Much of the heathland on the Wiltshire side of the border, around Landford (where *Tapinoma erraticum/ambiguum*, *Myrmica sulcinodis*, *Tetramorium caespitum*, *Formica cunicularia* and *F. sanguinea* were recorded in the past) seems to have deteriorated, with grass replacing heather, so it was not studied. The populations of the more interesting species will presumably have declined, and some may now be extinct in Wiltshire.

Acid soils are still important for the presence of *Formica rufa*, which is not found on chalk, for reasons that are not fully understood. It is present at several sites south of Salisbury, as well as in the north of the New Forest. The "wood ants" are of interest to conservationists because of their role in woodland ecology and as hosts to a number of myrmecophilous species. There is concern that they may be declining nationally.

ACKNOWLEDGEMENT

The Ministry of Defence is acknowledged for allowing access to the Ranges at Porton.

REFERENCES

- André, E., 1881. *Species de Hyménoptères d'Europe et d'Algérie*. Volume 2, pp 273. Beaune.
- Anonymous, 1990. *Wildlife and Archaeology at Porton Down*. 12pp. Crown Copyright, 1990. Designed by Main Titles Associates for MoD PR.
- Brian, M.V., 1977. Ants. *The New Naturalist*, 59. 223pp. Collins, London.
- Buschinger, A., 1976. Giftdrusensekret als Sexualpheromon bei der Gastameise *Formicoxenus nitidulus* (Nyl.) (Hym., Form.). *Insectes Sociaux*, 23(3): 215–226.
- Collingwood, C.A., 1961. New Vice-County Records for British Ants. *Entomologist's Record and Journal of Variation* 73: 90–93.
- Collingwood, C.A., 1966. Notes on British Ants, 1964–1965. *Entomologist's Record and Journal of Variation* 78: 23–25.
- Collingwood, C.A., & Barrett, K.E.J. 1964. The identification and distribution of British ants. *Transactions of the Society for British Entomology*, 16(Part 3): 93–121.
- Collingwood, C.A., 1979. The Formicidae (Hymenoptera) of Fennoscandia and Denmark. *Fauna Entomologica Scandinavica*, Vol 8. 174 pp.
- Donisthorpe, H.St.J.K., 1927. *British ants: their life history and classification*. 436 pp. Routledge and Sons Ltd, London.
- Dubois, M.B., 1998. A revision of the Ant Genus *Stenamma* in the Palaearctic and Oriental Regions. *Sociobiology*, 32(2): 193–403.
- Elgert, B., & Rosengren, R., 1977. The guest ant *Formicoxenus nitidulus* follows the scent trail of its wood ant host (Hymenoptera, Formicidae). *Memoranda Societatis pro Fauna et Flora Fennica* 53(1): 35–38.

- Falk, S.J., 1991. *A review of the scarce and threatened bees, wasps and ants of Great Britain*. Research and Survey in Nature Conservation, no. 35. Peterborough: Nature Conservancy Council.
- Geological Survey of England and Wales. Sheet 298 (Salisbury). 1903, reprinted (third impression) 1961.
- Geological Survey of Great Britain (England and Wales). Sheet 314 (Ringwood). 1902, reprinted (second impression) 1967.
- Geological Survey of Great Britain (England and Wales). Sheet 315 (Southampton). 1899, reprinted (third impression) 1964.
- Holldobler, B. & Wilson, E.O. 1990. *The Ants*. 732 pp. Harvard University Press, Cambridge, Mass.
- Stäger, R., 1925. Das Leben der Gastameise (*F. uittidulus* Nylander) in neuer Beleuchtung. *Zeitschrift für Morphologie und Ökologie der Tiere*, 3(2–3): 452–476.
- Stumper, R., 1950. Les associations complexes des fourmis: commensalisme, symbiose et parasitisme. *Bulletin Biologique de la France et la Belgique*, 84(4): 376–399.
- Seifert, B., 1992. A taxonomic review of the Palaearctic members of the ant subgenus *Lasius* s.str. *Abhandlungen und Berichte des Naturkundemuseum Goerlitz*, 66: 1–67.
- Thomas, J.A., 1992. *Butterflies of the British Isles*. 160 pp. Hamlyn Publishing Group Limited.
- Thomas, J.A., 1994. The ecology and conservation of *Maculinea arion* and other European species of large blue. In *Ecology and conservation of butterflies* (A.S. Pullin, ed.) pp. 180–196. London: Chapman & Hall.
- Wardlaw, J.C., Elmes, G.W. & Thomas, J.A., 1998. Techniques for studying *Maculinea* butterflies: II. Identification guide to *Myrmica* ants found on *Maculinea* sites in Europe. *Journal of Insect Conservation*, 2: 119–127.

A Key to the *Lasius* species found in mainland Britain (after Seifert, 1992)

Workers

- 1 Colour shining black; head large, broadly cordate, occiput emarginate *fuliginosus*
- Colour otherwise—greyish or brownish black, slightly bicoloured or yellow 2
- 2 Colour yellow or brownish yellow; maximum eye length one sixth of head width 3
- Colour greyish to brownish black, alitrunk sometimes paler than gaster; eye length more than one fifth of head width 7
- 3 Antennal scapes and front tibiae with numerous suberect hairs standing out clearly from general pubescence 4
- Antennal scapes and front tibiae with pubescence only or at most an occasional hair 5
- 4 Scapes and all tibiae flattened with a thin front edge; petiole scale subrectangular; funiculus segments clearly longer than broad *meridionalis*
- Scapes and tibiae rounded elliptical; petiole scale with curving sides; funiculus segments cup-shaped *mnbratus*
- 5 Body hairs long, especially on promesonotum; scapes, tibiae and underside of head with pubescence only *flavus*
- Body hairs very short; underside of head with some long hairs 6
- 6 Hind tibiae with 2 or 3 suberect hairs; dorsal body hairs up to 0.06–0.08 mm long *sabularum*
- Hind tibiae with pubescence only; dorsal body hairs very short, less than 0.05 mm *mixtus*
- 7 Scapes and all tibiae with abundant standing hairs 8
- Scapes and tibiae without standing hairs, or 2 or 3 at most 9
- 8 Clypeus with close pubescence; dorsal body hairs of even length. Colonies in earth nests or under stones in open environments, towns and gardens *niger*
- Clypeus with sparse pubescence; long hairs on promesonotum standing out

- from the rest. Woodland species nesting in tree stumps or marshy places..... *platythorax*
- 9 Head and alitrunk paler than gaster; head nearly as broad as long; frontal triangle and furrow clearly indicated..... *brunneus*
- Head always as dark as gaster; frontal furrow indistinct or obscured by pubescence..... 10
- 10 Hind tibiae with 2 or 3 suberect hairs and some short hairs on the declivitous face of the propodeum..... *psammophilus*
- All tibiae without suberect hairs; declivitous face of propodeum without short hairs..... *alienus*

Queens

- 1 Colour shining black; head broadly cordate and clearly wider than alitrunk; scutum overhangs the pronotum..... *fuliginosus*
- Colour yellowish brown to dull black; pronotum not obscured by scutum in dorsal view..... 2
- 2 Front tibiae and antennal scapes with numerous standing hairs..... 3
- Front tibiae and scapes bare with an occasional standing hair only..... 6
- 3 Head distinctly narrower than alitrunk; eyes bare..... 4
- Head at least as broad as alitrunk; eyes with short hairs..... 5
- 4 Alitrunk flattened dorsally; ventral head hairs long (0.19–0.22mm); clypeus with sparse pubescence..... *platythorax*
- Alitrunk with rounded dorsum; ventral head hairs short (0.15–0.17); clypeus with close pubescence..... *niger*
- 5 Scapes and tibiae flattened with thin front edge; petiole scale subrectangular; body colour dark; funiculus segments clearly elongate; general pubescence thin..... *meridionalis*
- Scapes and tibiae rounded elliptical; petiole scale with broadly rounded sides; colour yellowish brown to dark brown; funiculus segments cup-shaped; pubescence thick..... *umbratus*
- 6 Head at least as broad as alitrunk..... 7
- Head narrower than alitrunk..... 8
- 7 Dorsal body hairs extremely short, less than 0.06mm; scapes and tibiae always without standing hairs..... *mixtus*
- Dorsal body hairs up to 0.08mm; hind tibiae with occasional suberect hairs..... *sabularum*
- 8 Underside of body yellowish; eyes with microscopic hairs..... *flavus*
- Body colour evenly dark; eyes bare or with one or two hairs at most..... 9
- 9 Head marginally narrower than alitrunk; frontal triangle and furrow clearly indicated; body hairs short, pubescence sparse and decumbent..... *brunnens*
- Head distinctly narrower than alitrunk; frontal triangle and furrow obscured by pubescence; hairs on dorsum long..... 10
- 10 Scapes and tibiae without suberect hairs..... *alienus*
- Scapes and hind tibiae with occasional hairs..... *psammophilus*

Males

- 1 Whole body shining black; head cordate..... *fuliginosus*
- Body colour various shades of greyish brown to black; occipital border straight..... 2
- 2 Head distinctly narrower than alitrunk..... 3

- Head at least as wide as alitrunk 8
- 3 Mandibles with apical and one pre-apical tooth *flavus*
- Mandibles with apical tooth only, masticatory border smoothly rounded into pre-apical cleft 4
- 4 Scapes and tibiae with suberect hairs 5
- Scapes and front tibiae without hairs 6
- 5 Body size larger, alitrunk length 1.7–1.9 mm *niger*
- Body size smaller, alitrunk length 1.55–1.65 mm *platythorax*
- 6 Frontal triangle and furrow distinct *brunneus*
- Frontal triangle and furrow obscured by pubescence 7
- 7 All tibiae without suberect hairs *alienus*
- Hind tibiae with 2 or 3 hairs on extensor surface *psaunniophilus*
- 8 Scapes and tibiae with outstanding hairs 9
- Scapes and tibiae hairless 10
- 9 Body colour dull black; head features obscured by pubescence *umbratus*
- Body colour moderately shining black; frontal triangle and furrow distinct *meridionalis*
- 10 Mandibles with 5 or more distinct teeth *sabularum*
- Mandibular dentition weak and indistinct *mixtus*

BOOK REVIEW

Insects on Palms. F. W. Howard, D. Moore, R. M. Giblin-Davis, R. G. Abad. CABI Publishing, Wallingford, Oxon, UK. 2001. 400 pages 16 colour plates. £65

The authors have arranged the book in 8 sections, each of which focuses on aspects of the insects' behaviour rather than dealing with each species in turn. Section 1 is an introduction to the Class Insecta and the plant family Palmae; 2 deals with defoliators of palms; 3 with sap feeders on palms; 4 with insects of palm flowers and fruits; 5 with palm borers; 6 with population regulation of palm pests; 7 with the principles of insect pest control on palms and 8 with field techniques for studying palm insects. For me this system makes the book much more readable. As a non-entomologist, whose interest in insects stems from their role as vectors of plant diseases, I found the first chapter particularly informative, although the palm family was dealt with in much more detail than the insects. Throughout the book the authors make use of boxes of text to provide extra information. I am not sure if this is part of the publishing house style but I found it does allow the authors to give plenty of side detail on the uses of palms, their diseases and methods of sampling for insects on palms for example. This does mean that readers do not have to treat the book as a work of reference but can dip in and out for pleasure. The book is well illustrated with both colour and monochrome photographs, line drawings and tables. Colour reproduction is generally good but the black and white photographs are variable with some appearing to lack contrast; some of the reproductions of older line-drawings are rather poor. I felt that some of the monochrome plates would have benefited from colour, especially those detailing Lepidoptera or species of palm, but that might have pushed the price too high. Although not intended as an identification manual or complete list of every insect found on palms, this is a very practical book for any who have an interest in palms and the insects associated with them. Mites are given honorary insect status but you would not get that from the title!

PHIL JONES